Directorate of
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Indian Airpower: Modernization and Regional Supremacy

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An Intelligence Assessment

NESA 84-10296
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An Intelligence Assessment

This paper was prepared by [redacted] 25X1
Office of Near Eastern and South Asian Analysis. It was coordinated with the Directorate of Operations. Comments and queries are welcome and may be directed to the Chief, South Asia Division, NESA, [redacted] 25X1

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Indian Airpower: Modernization and Regional Supremacy

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Key Judgments

Information available as of 1 November 1984 was used in this report.

India's modernization of its Air Force, a high-priority program over the last five years, has enabled New Delhi to maintain its margin of military superiority over Pakistan. Through the acquisition of modern Soviet and Western equipment, India has increased the range, speed, and weapons payload of its Air Force.

The introduction of new aircraft and advanced equipment into the Indian inventory over the next several years probably will increase the gap between India and Pakistan. The widening gap is likely to cause Islamabad to press the United States for more advanced weapons.

India's Air Force continues to have serious deficiencies, however, and it lacks the full range of capabilities of a modern Western air force. The level of pilot proficiency and experience is relatively low, and the number of early warning and target tracking radars, electronic countermeasures, and navigational and communications equipment is inadequate. In addition, the Indian Air Force currently lacks airborne warning and control aircraft, aerial refueling tankers, precision-guided air-to-ground munitions, and an airlift capability sufficient to move large numbers of troops and suppliers quickly.

India's modernization program depends on equipment, production licenses, and technical assistance from the Soviet Union and Western manufacturers. Moscow's reliability as a supplier and its concessional financing and willingness to give New Delhi preferential treatment in the transfer of advanced technology provide the Soviet Union with an appreciable edge in sales competition with Western countries.

Still, India will make selected purchases of high-technology equipment from the West—perhaps somewhat more than in the past under India's new Prime Minister—particularly where adequate substitutes are not available from the USSR. Such acquisitions probably will include aircraft, missiles, radars, and electronic warfare equipment. West European firms are likely to have more success than US firms because of less restrictive arrangements and export controls and because of general Indian unhappiness with US support for Pakistan. If India and the United States can reach agreement on a memorandum of understanding on technology transfer, India probably would begin serious talks with US companies to buy transports, tankers, radars, and other electronic equipment.

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Indian Airpower: Modernization and Regional Supremacy

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The Indian Air Force, already the largest and most powerful in non-Communist Asia, is engaged in a major modernization program. The program, begun in the late 1970s, received increased emphasis following the late Prime Minister Indira Gandhi's return to power in 1980. Rajiv Gandhi, who succeeds his mother as Prime Minister, is likely to continue to give high priority to expanding Air Force capabilities because of his technocratic background and general commitment to modernization.

India is acquiring more modern fighters, helicopters, support aircraft, and improved missiles to enable the Air Force to defend Indian airspace more effectively, to support operations of the Army and Navy, and to destroy Pakistan's warmaking potential in the event of another war (see inset, "Indian Air Force: Strategy and Doctrine"). The Navy's air arm also is being upgraded with better aircraft and electronic warfare equipment to extend the striking power of the Indian fleet, protect its surface combatants, and perform longer range maritime reconnaissance, according to US defense attache reporting.

Since 1979 these efforts have included the purchase of:

- Seven different types of fighters and fighter-bombers.
- Two specialized types of helicopters.
- Light and heavy transports.
- Long-range maritime surveillance aircraft.
- More effective air-to-air and air-to-surface missiles.

India also is negotiating for:

- Its first airborne early warning aircraft and aerial refueling tankers.
- Additional specialized helicopters.
- Newer air-launched missiles.[2]

[2] See appendix A for details on purchases and current negotiations for aircraft and missiles.

Senior government and defense leaders have indicated publicly that the need to modernize and accelerate procurement for a stronger and more capable air force stems from heightened concerns over Pakistan's force improvement programs and from the need to replace a growing inventory of obsolete aircraft and air-launched missiles. We believe the demonstration of modern air technology in the Falkland Islands conflict and Israel's invasion of Lebanon reinforced assessments by Indian military planners that modernization of Indian airpower was overdue.

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In our view, India has a long-term ambition to become a world-class military power, and a strong, modern air force is a key prerequisite. We believe India's overall defense policy is aimed at maintaining regional hegemony and at minimizing superpower influence in South Asia by being capable of projecting military power beyond its immediate borders.

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Foreign Dependency

India's air modernization program will remain dependent on imports, licensed production, and foreign technical assistance from the Soviet Union and Western manufacturers. Self-sufficiency in aircraft production is beyond New Delhi's reach, and advances in the highly industrialized nations will continue to widen the technological gap between them and India despite ambitious efforts by India's defense industry.

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USSR. India places heavy reliance on the USSR for aircraft and related equipment. Senior Indian Government officials have publicly stated their view that Moscow is a more reliable arms supplier than the West largely because the Soviet Union stood by New Delhi while Western countries did not during India's past hostilities with its neighbors. The ruggedness and relative simplicity of Soviet weapons also commend

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Indian Air Force: Strategy and Doctrine

The deployment of India's air assets reflects its security priorities. Twenty-two of India's 35 combat squadrons are stationed in the Western and Southwestern Air Commands, according to imagery, demonstrating that New Delhi considers Pakistan the most immediate threat. These squadrons include India's most modern fighters and fighter-bombers—MIG-23s and Jaguars. 25X1

Only seven combat squadrons in the Eastern Air Command are oriented toward China, which New Delhi views as a long-term threat, according to Indian and Western scholars. These squadrons consist of older fighters such as MIG-21s and Hawker Hunters. China has two squadrons of F-6 fighters based within 300 nautical miles of the Indian border, according to imagery. 25X1

Press accounts indicate that India is increasingly concerned about the vulnerability of its Laccadive and Andaman-Nicobar Island chains and offshore oilfields. Acquisition of new longer range aerial refuelable aircraft and the diversion of existing aircraft, including some Jaguars, to the newly created Southern Air Command will enhance the capability of the Indian Air Force to defend India's islands. 25X1

In the event of hostilities, we judge that Air Force doctrine calls first for establishing air superiority, which would include the destruction of enemy aircraft in the air and on the ground. Knocking out Pakistan's F-16s, for example, probably would be one of the highest priorities in a fourth Indo-Pakistani war. The Air Force's next objectives, we believe, would be to provide tactical support to ground forces and to destroy targets deep within enemy territory. Such targets would include defense installations, airfields, supply depots, military forces in reserve, major lines of communication, and, in the case of Pakistan, nuclear facilities. 25X1

Air Force operational plans call for seven designated forward staging airfields along the Indo-Pakistani border to be activated on a full-time basis if war were to break out with Pakistan. According to US military reporting, air defense and strike aircraft would relocate from home bases to these staging fields to maximize aircraft combat radius and time over target. Four other forward airfields have been upgraded over the last several years to operational fighter bases, apparently to shorten the response time to the air threat from Pakistan. 25X1

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them to India's Air Force. Moreover, Moscow sells modern aircraft equipped with advanced systems on easy credit terms—small downpayments, low interest rates, and long repayment periods—and can deliver the equipment relatively quickly. Unlike Western suppliers, the Soviet Union as a rule does not demand scarce hard currency in payment but allows New Delhi to pay for arms with commodities. Finally, in recent years the Soviets have shown a greater willingness to provide licenses and technical assistance for the production of modern Soviet aircraft in India such as the MIG-27 and MIG-29,

The USSR is the largest supplier of aircraft and related equipment to India. Of the more than $11 billion worth of aircraft purchased by India since 1970, about 65 percent has been from the USSR—the remainder comes from West European countries—according to our estimates. Since 1980, purchases from the Soviet Union have amounted to almost 75 percent (nearly $6 billion) of all aircraft purchases. 25X1

We expect imports of aircraft and missiles from the USSR will continue to receive high priority from the Indian Government for the remainder of the decade. New Delhi is buying the MIG-29, one of the most capable air superiority fighters now entering service with Soviet forces. We believe the decision to purchase the fighter rather than assemble Mirage 2000s—one of the alternatives considered by New Delhi—reflects a greater 25X1 25X1 25X1

willingness by Moscow to export a state-of-the-art–equipped aircraft to counter growing sales efforts by West European arms producers. New Delhi also is likely to purchase several new Soviet support aircraft being offered by Moscow.

The West. In recent years, New Delhi has purchased selected high-technology aircraft, helicopters, and missiles from Western Europe to supplement procurement from the Soviet Union.[3] In April 1979 the Indian Government chose the British Jaguar as its deep-penetration strike aircraft—India's first purchase of a Western fighter in more than a decade. That same year, the Navy purchased the British Sea Harrier as its new attack aircraft. New Delhi selected the French Mirage 2000 armed with new missiles in 1982 over a Soviet fighter because it was the best aircraft on the market at that time to counter the F-16s being acquired by Pakistan. In 1983 New Delhi bought from Britain the latest Sea King antisubmarine warfare helicopter and Sea Eagle antiship missile. The Indian Government also recently decided to collaborate with the United Kingdom on the design and manufacture in India of a new light combat aircraft,

In our judgment, the late Prime Minister Indira Gandhi approved the purchases from Western Europe on the advice of senior military leaders We believe the poor combat performance of Soviet aircraft and missile systems in the Middle East, coupled with the effectiveness of Western weapons in the Falkland Islands and Lebanese conflicts, have reinforced Indian interest in selected Western arms. A number of Indian military officers have also been unhappy that some Soviet weapons delivered in the past lacked advanced features found on comparable models used by Soviet forces,

Indira Gandhi's willingness to buy from the West, in our view, also reflected concern about the ramifications of Indo-Soviet relations.

she was sensitive to charges by opposition leaders and Western observers that under her rule India had become a Soviet proxy. she believed that close identification with Moscow may have been limiting her government's foreign policy options, weakening New Delhi's leadership role among the nonaligned states, and leaving the military services too dependent on a single source of supply. We believe she also was willing to exploit East-West competition for India's benefit.

Because of his technocratic background, India's new Prime Minister, Rajiv Gandhi, may be inclined to give more weight to technical rather than political factors in selecting new weapon systems. This may cause him to favor buying more equipment from the West than his mother did. Nevertheless, purchases of aircraft from the West are likely to remain small relative to those from the USSR, in our judgment, even with stepped-up sales efforts by Western suppliers.

There are limits to Rajiv's ability to diversify and reduce India's dependence on Soviet arms. Moscow is firmly entrenched as New Delhi's principal arms supplier, and India could not afford the expense and time-consuming process of a major transition to Western systems. Press reports also indicate that many Indian officials do not believe they could depend on long-term Western military support.

Domestic Aircraft Production

New Delhi assigns a high priority to the development of a modern aircraft industry and views domestic production as a key element in modernizing its Air Force. New facilities are being constructed, and research and development efforts are being expanded, according to public statements by senior Indian officials.

India's aircraft industry is dominated by a government-controlled corporation—Hindustan Aeronautics Limited (HAL)—the largest firm in the defense sector. Its 11 operating plants, employing more than 40,000 people, produce high-performance jet fighters, trainers, helicopters, transports, aircraft engines, and

a variety of avionics equipment and accessories, according to Ministry of Defense reports.[4] The US defense attache reports that a 12th plant is under construction.

Despite New Delhi's ambitious efforts to produce modern aircraft, the industry continues to be plagued with deficiencies. These include manufacturing shortcomings, bureaucratic indecisiveness, and financial constraints. Such deficiencies have recently caused HAL to cut back its planned production of fighters, helicopters, and trainers for 1984-85, according to US defense attaches. Consequently, imports, licensed production, and foreign technical assistance will remain essential to India's program to modernize its airpower.

Organization and Missions

The 115,000-man Indian Air Force has an estimated 650 combat aircraft in 35 squadrons and is organized into five regional commands plus a training command (see map). The regional commands are responsible for air defense, close-air support, interdiction, and transport services in their respective geographic areas.

The Navy also has a small air arm of some 80 fixed- and rotary-wing aircraft assigned to maritime patrol and protection of the Indian fleet, islands, and offshore oil facilities. Naval aircraft assigned maritime missions are supplemented by some 40 Air Force aircraft based at Pune.

Operational Readiness

The Air Force readiness plan calls for its regional command along the border with Pakistan to maintain the capability to be "fully combat ready" within 24 hours of an initial alert, according to US military sources. Readiness probably varies considerably depending on the region and aircraft, with modern fighters committed to the Pakistani front undoubtedly having the highest priority for maintenance and repair. We estimate, on the basis of fragmentary data on operational readiness, that only 60 to 70 percent of all Indian tactical aircraft are combat ready at any given time under current peacetime conditions. By comparison, we judge that the Soviets maintain about 90 percent of their tactical aircraft in an operationally ready condition.

[4] See appendix B for details on domestic aircraft production.

India's efforts to improve readiness are encountering difficulty because of the large number of new aircraft and related systems being integrated into the inventory. According to US defense attaches, acquisition of advanced Western and Soviet aircraft, missiles, and electronic systems—and the mixing of the two technologies—is taxing India's technical, logistic, and training capabilities. We judge that skilled technical and maintenance personnel are not being trained fast enough to meet India's growing needs. Moreover, foreign aircraft specialists, on whom India relies heavily, are not always available when maintenance is needed, according to US defense attaches, and many Western and Soviet aircraft still must be returned to the manufacturer for major overhaul. The need to stock, catalogue, and distribute spare parts for the different types and sources of new equipment on a timely basis, in our view, also has hampered readiness. Poor aircraft maintenance and logistic support have been cited by US defense attaches as major factors in the Air Force's high accident rate (see inset, "The Air Force's High Accident Record").

Pilot Proficiency. Pilot deficiencies and inexperience also are impeding readiness. US defense attaches report that Indian air-to-air training puts too much emphasis on theory and lectures and not enough on realistic aerial combat exercises. They indicate that exercises usually involve mock combat between the same type of aircraft using the same tactics. A more effective practice used by the United States calls for dissimilar aircraft and tactics. The attaches indicate that retention of experienced pilots also is becoming an increasingly serious problem because military pay has not kept pace with opportunities in the civilian sector.

Pilot proficiency is also hampered by inadequate training facilities and equipment. According to US defense attaches, the Air Force needs more aerial combat instrumentation ranges where air-to-air engagements are recorded and used as an integral part of the learning process for pilots. Air-to-ground ranges also require better instrumentation to determine the accuracy of strafing and bombing runs. The time-consuming visual method now used in India

Figure 1
Indian Air Force Airfields and Commands

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The Air Force's High Accident Record

The Indian Air Force has one of the highest accident rates of any air force in the world, and senior Indian defense officials and members of Parliament have publicly expressed concern over the high rate. Based on data from a prominent Indian journal [redacted] *we estimate that the Indian Air Force is losing an average of 10 pilots and 20 to 25 aircraft a year (see figure 2), including frontline British Jaguars and Soviet MIG-23s. Their replacement costs on today's market are about $18 million and $9 million a unit, respectively. We calculate, based on data from the Indian journal, that 23 aircraft were destroyed in 1982 per 100,000 flying hours, 10 times higher than the comparable US Air Force rate that year as reported in a US technical journal. Fragmentary data for 1983 and 1984 suggest that the Indian rate remains high.* [redacted] 25X1

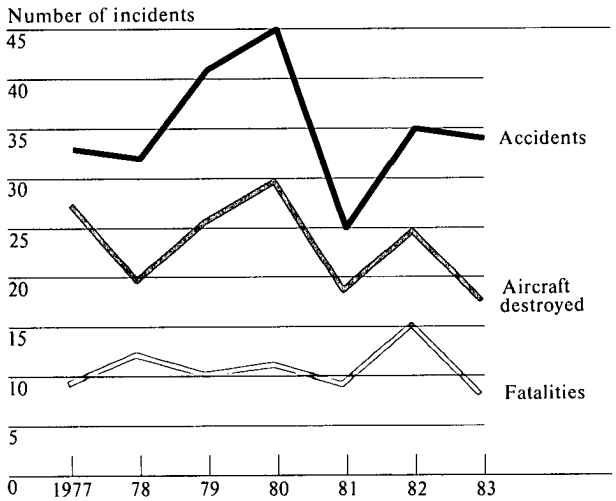
According to US defense attache reporting, accidents are caused by:

- *Engine and mechanical failures, which account for 40 percent of all accidents. Contributing factors include the advanced age of many of the aircraft, an inadequate inventory of spares, and poor maintenance. The latter is complicated by the large variety of aircraft in service.*
- *Pilot error, resulting largely from insufficient training and inexperience. Fifty percent of all accidents involve pilots with only two to five years of flying experience.*
- *Adverse weather conditions and the all-too-frequent failure of instrument landing and ground-based navigational systems used in assisting aircraft in landing under conditions of poor visibility.*
- *Damage from birds hitting aircraft, which has become more frequent and serious since the late 1970s because of the increasing use of aircraft in low-altitude, high-speed attack profiles.* [redacted] 25X1

India's Defense Minister, under pressure from Parliament and the late Prime Minister Gandhi, instructed senior Air Force commanders to adopt improved flight safety measures to reduce the loss rate, according to US defense attaches. An Indian journal reported that a senior air staff officer was selected in 1982 to study the causes of accidents; the selection, training, and motivation of pilots, technicians, and other support personnel; and the availability of training aids and equipment at Air Force facilities and operational units. Although the Ministry of Defense has refused to disclose publicly the officer's findings and recommendations, an unconfirmed press article indicates that the report highlighted an urgent need to improve training and to provide better financial incentives to attract and keep qualified pilots and technical support personnel. [redacted] 25X1

India is considering other ways to lower the accident rate. US defense attache reporting indicates that the Air Force may implement a more conservative training philosophy by restricting flying in marginal weather and instituting more stringent procedures for night flying and low-level air-to-ground training, although we have yet to see evidence of this. Improving training, maintenance of equipment, and quality control of aircraft and parts production should help, but deliveries of new Soviet and Western aircraft and related systems over the next several years will continue to challenge Indian capabilities. The government also has asked its Environmental Committee to examine ways of reducing the bird menace through such measures as eliminating refuse near airfields. [redacted] 25X1

Figure 2
Indian Air Force Accidents and Losses[a]



[a] Fiscal year beginning 1 April of year shown.

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limits the number of daily practice runs that an individual ground attack aircraft can make. The attaches and Indian press indicate that more flight simulators, additional visual training aids for the classroom, and better landing and navigation systems at airfields also are needed.

Since mid-1982 the Air Force has made a greater effort to raise pilot proficiency and retain qualified personnel. According to US military reporting, this includes more extensive training in various air attack and support profiles. In our view, the use of joint exercises, live ammunition, and airmobile deployments of troops and equipment at night is adding realism to the training. US defense attaches indicate that the Air Force is building a new air-to-ground firing range and is attempting to acquire more flight simulators and training aids to further assist in correcting pilot deficiencies. Indian press reports indicate that the government also is considering providing more opportunities for advancement to Air Force officers as well as higher flight pay and retirement benefits and better housing allowances.

Capabilities

The range, speed, and weapons payload of India's aircraft are increasing appreciably with the acquisition of new Soviet and Western equipment (see table 2, foldout, and figures 3 and 4). India's air intercept capabilities have been enhanced with the delivery of MIG-23 interceptors equipped with better air-to-air missiles. The expected arrival shortly of Mirage 2000s and MIG-29s, both equipped with even more advanced missiles and avionics, will further improve air intercept capabilities. The addition of Jaguar, MIG-23, and MIG-27 ground attack aircraft offers India more flexibility and a wider choice of missions, from low-level strike, interdiction, and close-air support to armed reconnaissance. 25X1

Still, the Indian Air Force lacks the full range of capabilities found in the air forces of the superpowers and other major Western nations. It lacks airborne warning and control aircraft, aerial refueling tankers, and an airlift capability sufficient to move large numbers of troops and supplies. It currently has no precision-guided air-to-surface munitions in its inventory. Its low- to medium-altitude surface-to-air missile system, early warning and target tracking radars, electronic countermeasures, and navigation and communications equipment also need upgrading, according to US defense attache reporting and open sources. 25X1

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India's Air Force is likely to remain larger and better equipped than Pakistan's Air Force, however, even though Islamabad's receipt of advanced US equipment would almost certainly result in higher Indian losses in the early stages of combat—a major concern to Indian leaders.[5] India's numerical advantage in combat aircraft, number of ground-based air defense missile systems, and radar-controlled antiaircraft guns (see figure 5) would eventually make itself felt in opposing Pakistani attacks against Indian targets. 25X1

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[5] Islamabad has received 21 of 40 US F-16s purchased and is expected to get the AIM-9L air-to-air missile shortly. According to US diplomatic sources, the Pakistanis also are seeking additional F-16s, advanced electronic countermeasures, and AWACS aircraft from the United States. 25X1

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Figure 3. Three of the latest combat aircraft in India's inventory—MIG-23BN, MIG-21BIS, and Jaguar.

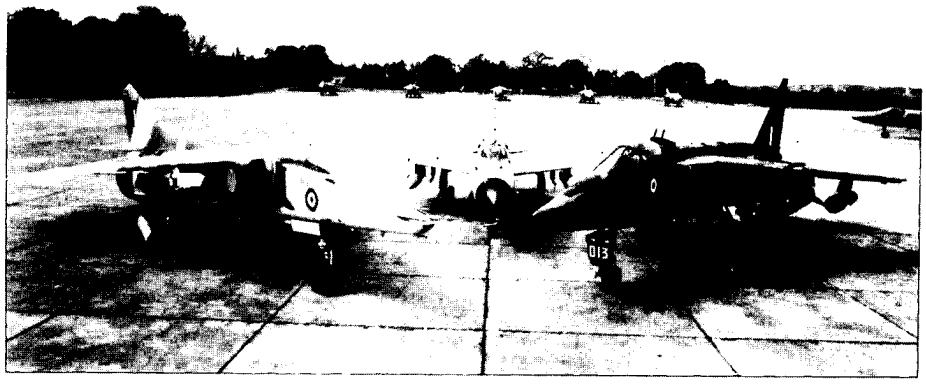

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Figure 4. Mirage 2000 aircraft.

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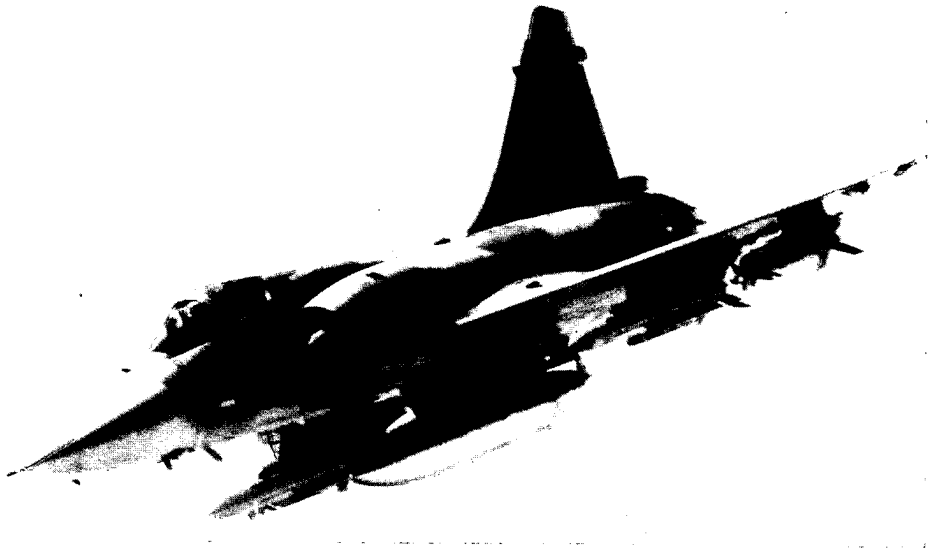

The expected introduction of additional aircraft, missiles, and electronic warfare equipment into the Indian inventory over the next few years will further increase India's edge over Pakistan, in our view. We judge that the MIG-29's all-weather radar-guided missiles give the aircraft a medium-range capability superior to Pakistan's F-16, which is equipped with infrared guided missiles, even though the two aircraft are comparable in aerodynamic performance. Moreover, the new precision-guided munitions that the Indian Air Force is likely to acquire will permit India's strike aircraft to attack key Pakistani ground targets more effectively (see inset, "Capabilities To Conduct a Preemptive Airstrike Against Pakistan's Nuclear Facilities").

We believe that the Pakistanis can neither provide effective air defense for their military and industrial targets against a concerted Indian air attack nor seriously threaten most strategic targets in India. We judge that the Pakistanis are hampered by poor command and control, the lack of a fully integrated air defense network, a small number of air defense missile systems, and inadequate training. Moreover, Pakistan's Air Force is equipped largely with aging, short-range Chinese-made F-6s (a copy of the Soviet MIG-19), a poor match for India's MIG-21 and MIG-23 interceptors. Pakistan's small number of more modern French Mirage 5's and F-16s, however, are capable of inflicting some damage on important Indian targets.

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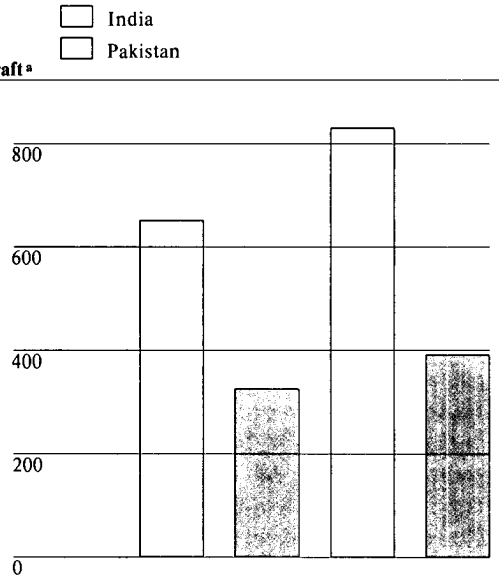
Figure 5
Current and Projected Indian and Pakistani Air and Air Defense Equipment

Note scale change



		Oct. 84	Oct. 89
India			
	MIG-21s (all models)	300	350
	MIG-23s	90	120
	MIG-27s	0	70
	MIG-29s	0	40
	Jaguars	40	110
	Mirage 2000s	0	40
	Sea Harriers	6	20
	Other older aircraft	214	80
	Total	650	830
Pakistan			
	A-5s	50	100
	F-5s	150	100
	F-7s	0	50
	F-16s	21	40
	Mirage III/5s	94	100
	Other	10	0
	Total	325	390

India			
	SA-2s	18	18
	SA-3s	30	30
	SA-6s	6	6
	SA-8s	0	6
	Total	54	60
Pakistan			
	SA-2s	2	2
	Crotales	6	12
	Totals	8	14

India			
	Total	1,450	1,500
Pakistan			
	Total	50	250

[a] Excludes combat-capable trainers and aircraft in reserve storage.

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Capabilities To Conduct a Preemptive Airstrike Against Pakistani Nuclear Facilities

India, in our view, has the capability to carry out a preemptive airstrike that would inflict major damage on Pakistan's most critical nuclear facilities, the Kahuta Enrichment Plant and the PINSTECH–New Laboratories reprocessing facility, both near Islamabad. The Indian Air Force probably could overwhelm Pakistan's air defenses around Kahuta and PINSTECH and destroy or sufficiently damage the facilities to prevent Islamabad from producing nuclear weapons for several years. Such an attack would probably retard Pakistan's developing capability to produce fissile material; seriously damage its nuclear research and development facilities, as well as the infrastructure necessary to fabricate, assemble, and test nuclear weapons components; and perhaps kill many of its key personnel. We do not believe, however, that airstrikes alone would ensure the destruction of all the fissile material that Pakistan may have stockpiled.

Surprise and speed would be important for a successful Indian preemptive strike. To increase the chance of surprise, Indian aircraft would probably be launched directly from home airfields near the Pakistani border. Because of the short distances between Pakistan's nuclear facilities and Indian airfields—about 30 minutes' flying time—and Pakistan's poor command, control, and communications, we judge that Islamabad could not blunt a massed Indian airstrike. If the Pakistanis were alert to the possibility of an attack, however, India probably would suffer serious losses.

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The Indians would most likely employ their Jaguar aircraft. Some 40 are currently in New Delhi's inventory. The Air Force also has at least 90 MIG-23s that could be used to provide air cover and/or to attack ground installations. Both aircraft have the range to reach Kahuta and PINSTECH from bases in western India.

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Because the Indian Air Force currently does not possess state-of-the-art bombing computers or precision-guided air-to-ground munitions, its contingency plans probably call for several sorties against each target to increase the chance of success. India is seeking precision-guided munitions for its aircraft, but, until such missiles are obtained, the Air Force would have to use its inventory of 225- and 450-kilogram bombs in a preemptive strike.

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The best window for a preemptive airstrike, in our opinion, would be during November through February. Low precipitation and lack of clouds make visual target identification the easiest in this period.

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Prospects and Implications

In our view, threats perceived by India from traditional foes such as Pakistan and China as well as from an increased superpower presence in the region will continue to prompt New Delhi to strengthen its military forces and expand domestic aircraft production. Further modernization and expansion of airpower, we believe, are also part of New Delhi's long-term plan to play a greater military role in the Indian Ocean region.

Growth in Indian air capabilities for the remainder of the decade is likely to be greater than in the last five years because the number of new aircraft entering the inventory is relatively large and because much of the equipment is more advanced. Nevertheless, many current problems associated with command and control, training, maintenance, and the absorption of advanced technologies are likely to continue to hamper operational readiness. Moreover, we judge that the quality and level of technology of aircraft and components produced by Indian industry will remain well below what highly industrialized nations could provide.

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On balance, we believe improvements in Indian airpower not only will be more than sufficient to ensure New Delhi's continued superiority over Pakistan but

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also will provide a formidable counter to a challenge from China. By the late 1980s the growth in Indian air capabilities will permit India to monitor and perhaps even encourage New Delhi to interfere with activities of other foreign powers, including the United States, in the region. The Indian Air Force, however, almost certainly will not seriously challenge US or Soviet military moves in the region.

Implications for the United States. US participation in India's modernization of its Air Force will increase somewhat if the Indian and US Governments sign the memorandum of understanding on technology transfers now being negotiated. US companies will have new opportunities for sales of transports, tankers, and radars as well as communication, navigation, and other electronic equipment.

Rajiv Gandhi may be inclined to buy more Western arms than his mother did because of their better quality, but his ability to diversify and reduce India's dependence on the USSR for weapons is limited. Moscow's willingness to export some of its most advanced arms and production technology to New Delhi, Moscow's concessional financing, and its overall reliability as a supplier in Indian eyes are likely to ensure the USSR's continued dominant position in the Indian arms market.

Barriers to an appreciable improvement in Indo-US military cooperation, in our view, will continue to be India's suspicions of US intentions in the region—including India's strong opposition to the US military presence on Diego Garcia and in the Indian Ocean—US arms sales to Pakistan, and potential sales of weapons and technology to China. New Delhi has emphasized publicly and in diplomatic channels that it views US military sales to Islamabad as the most serious threat to Indian security and to regional stability. Indian officials publicly charge that the US-Pakistan security relationship challenges New Delhi's political and military dominance in South Asia and invites increased superpower competition in the Indian Ocean. They also have expressed the fear that growing US military involvement with China may fuel Sino-Pakistani cooperation against India.

At the same time, India's acquisition of new aircraft and missiles is likely to compel Pakistan to press the United States for more sophisticated arms. These will include combat and airborne surveillance aircraft, electronic countermeasures, air-to-air and air-to-surface missiles, and mobile air-defense missile systems.

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Appendix A

Air Force Modernization Efforts

India's purchase of more capable Soviet and Western fighters, helicopters, support aircraft, and missiles over the last five years is enabling its Air Force to perform a broader range of missions over longer distances. The Air Force is seeking to make additional purchases to further enhance its effectiveness.

Fighters/Fighter-Bombers

India's frontline fighters and fighter-bombers incorporate some of the most advanced technology being exported today:

- *Jaguars*. The Jaguar is the Air Force's primary deep-strike and interdiction aircraft, which is replacing India's Canberra bombers and Hawker Hunter fighter-bombers. US defense attache reporting and open sources indicate that the Jaguar's radar, navigation attack system, and electronic countermeasure equipment are being upgraded. Based on Indian press reports, we estimate that India currently has 40 Jaguars operational (at least five have crashed) and is assembling some 70 more from kits.

- *MIG-23s*. The MIG-23 provides a better deep-penetration capability and can carry a heavier bomb load than the obsolete Soviet SU-7 and Indian-produced HF-24 fighter-bombers it is replacing. about 150 MIG-23s, including 19 trainers, have been delivered by the Soviet Union. We estimate 90 of these are operational. The Indian Air Force has nearly completed the formation of six MIG-23 squadrons, three interceptor and three ground attack.

- *MIG-27s*. The MIG-27, a ground-attack derivative of the MIG-23, has an improved engine and avionics and a slightly heavier bomb load capacity. A contract for the licensed production of 165 MIG-27s was signed with Moscow in 1982, and represents the first export of this production technology to a Third World country. The press indicates that the first Indian-assembled MIG-27 is scheduled to roll off the production line in 1984, but the program is behind schedule, and we do not expect the first aircraft before early 1985.

- *Mirage 2000s*. The Mirage 2000, purchased to counter the US sale of F-16s to Pakistan, is a multirole aircraft which has an aerial refueling capability. In addition to its intercept capabilities, the aircraft will allow the Air Force to expand its role in defending India's islands in the Indian Ocean if India acquires aerial refueling tankers, a task previously reserved for the carrier-based aircraft of the Navy. Delivery of the 40 Mirage 2000s bought in 1982 is to begin before the end of the year, according to open sources.

The Indian Government recently announced publicly that it was dropping the option to produce the aircraft under French license.

- *Sea Harriers*. The carrier-based Sea Harrier is the Navy's primary strike fighter, replacing obsolete British Sea Hawks. In our judgment, Sea Harriers will improve the Navy's ability to defend India's growing oceangoing fleet against air attacks and will extend its striking power through greater range and better avionics and armament. Six of eight Sea Harriers purchased in 1979 have arrived in India since December 1983, and we expect the remaining two to be delivered by the end of the year. US defense attache and press reports indicate that India is close to completing a new contract for up to 12 additional aircraft.

- *MIG-21BIS*. This latest MIG-21 variant entered series production in India in 1983 after assembly of some 90 from kits, according to our estimates. We believe the aircraft will be the Air Force's primary air defense fighter through the 1980s, gradually replacing older Indian-built fighters. According to US defense attache reports, India is concerned about the MIG-21's weapons-carrying capability and is currently seeking low-cost ways to increase the weapons load of the aircraft.

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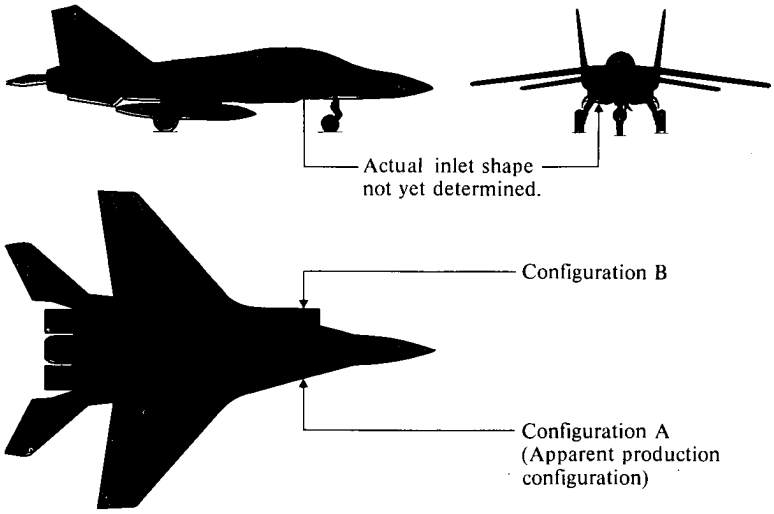
Figure 6
Soviet MIG-29 "Fulcrum A"



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- *MIG-29.* The Soviet MIG-29 air superiority fighter (see figure 6) is designed for air-to-air combat against such highly maneuverable aircraft as the US F-16 being acquired by Pakistan. The Soviet fighter is also capable of delivering laser-guided air-to-ground munitions, ordnance that the Indian Air Force is seeking to acquire. A contract providing for delivery of 40 MIG-29s and the assembly in India of another 130 was signed in mid-1984,

Moscow also agreed to sell the new AA-10 radar-guided missile and advanced cockpit technology with the aircraft.

the Soviets have promised the first deliveries for early 1985.

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Helicopters

India wants to add new specialized helicopters to its inventory. US defense attaches indicate that the Air Force and Army have requested helicopter gunships to improve close-air support for ground forces.

Eight Soviet MI-25s—the export version of the heavily armed MI-24 gunship used by Soviet forces in Afghanistan—were purchased in 1983 and delivered to India this spring for use by Indian Army units in the northwest In addition, the Indians are seeking other armed helicopters, including a version of the Soviet MI-8 helicopter equipped with a better engine—the MI-17—and one based on the French-designed Alouette III, according to US defense attaches.

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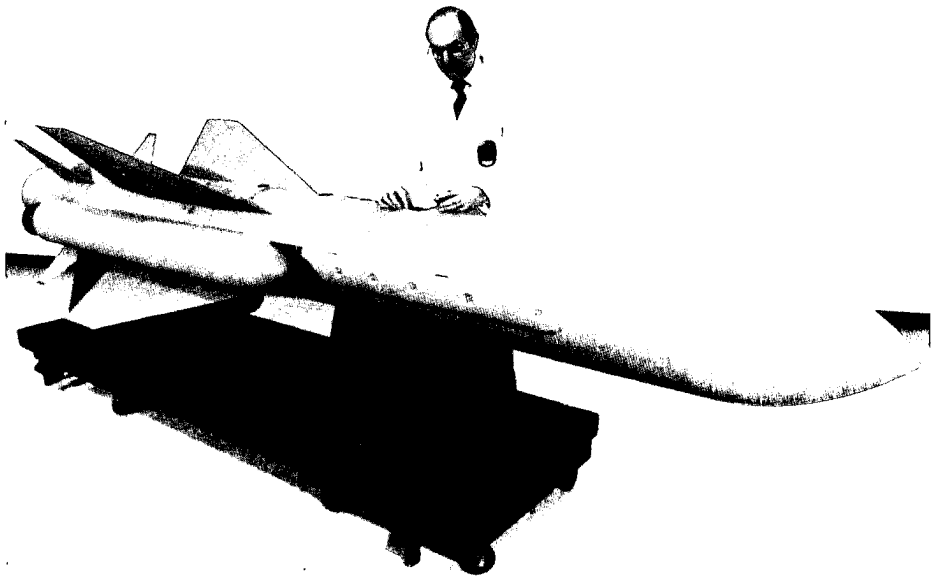
Figure 7. Helicopter-launched version of the British Sea Eagle missile sold to India. 25X1



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The Indian Navy is acquiring more advanced helicopters from the United Kingdom for antisubmarine warfare and antiship missions. According to US defense attache and Indian press reports, New Delhi ordered 20 of the latest model Sea King helicopters from Britain last year. They will be equipped with sophisticated electronic warfare equipment, torpedoes, and depth charges and will carry the British Sea Eagle antiship missiles (see figure 7). The Sea Kings most likely will operate from India's one aircraft carrier and from domestically produced frigates. The Navy also is believed to be seeking an advanced Soviet antisubmarine warfare helicopter—probably the KA-27 Helix—for use with its Soviet-built Kashin-class destroyers, which are now equipped with KA-25 Hormones. 25X1 25X1

Support Aircraft

India is in the process of replacing its obsolete transport fleet—a particularly weak link in the Air Force—with new Soviet transports, despite the Air Force's preference for US C-130s. In January 1984, New Delhi announced its decision to buy Soviet IL-76 heavy transports to replace its aging AN-12s, which US defense attaches report are increasingly being grounded because of airframe fatigue. They indicate that India will purchase at least six of the four-engine jet IL-76s and needs as many as 26. 25X1

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US defense attaches indicate that the Indian Air Force would prefer the US C-130 transport because of its better performance and that the decision to purchase the Soviet transport was politically motivated. 25X1

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In 1981 New Delhi bought 98 AN-32 light transports from the USSR, according to a reliable US defense attache source. The aircraft, a modified version of the twin-engine turboprop AN-26, will replace the Air Force's old US-built C-47 Dakotas and C-119 Packets. Although technical and equipment problems associated with the AN-32 program have caused repeated delays in deliveries, according to US defense attaches, about 12 of the Soviet transports are estimated to have arrived in India since early July, and we judge that as many as 30 could be delivered by the end of the year. The AN-32s will enhance Indian capabilities to airdrop troops and supplies. According to the attaches, they will be based at Agra, the home of India's elite airborne brigade.

New Delhi also is actively seeking to acquire its first airborne early warning aircraft. The British Nimrod is considered by New Delhi to be the best of the West European aircraft, the Nimrod is expensive and that the aircraft's manufacturer could not begin deliveries before 1987. Moscow has offered New Delhi an IL-76 configured as an early warning aircraft, but also probably could not begin deliveries immediately because of the Soviet Air Force's priority for the small number currently being produced.

Because India is unlikely to be able to import an early warning aircraft within the next few years, it is investigating the feasibility of modifying an Indian aircraft. the Indians are negotiating with West German and other West European firms to retrofit India's surplus commercial Boeing 737s and domestically produced HS-748 transports. Both aircraft would require extensive refurbishing and increased fuel capacity to perform early warning and maritime patrol functions.

India also wants to acquire a small number of tankers to provide inflight refueling for its Jaguars, Mirage 2000s, and maritime surveillance aircraft. The Air Force, which currently lacks an aerial refueling capability, has considered purchasing US KC-130s as well as modifying surplus commercial Boeing 737s for tanker use, according to US defense attache reports.

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Missiles

India is acquiring more effective air-launched Western and Soviet missiles for its frontline fighters (see table 1). US defense attache reporting indicates that Indian Jaguars and MIG-21s will carry French Matra 550 air-to-air missiles, while the Mirage 2000s will be equipped with the newer Super Matra 530-D missile. Moscow, to remain competitive, has agreed to include the new AA-10 radar-guided missile in its sale of MIG-29s to India.

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India has given the acquisition of precision-guided air-to-surface missiles a high priority, having assessed their effective use in the Middle East and Falkland Islands conflicts. US defense attache reporting indicate that New Delhi already has purchased the French Exocet and the longer range British Sea Eagle antiship missiles and the Soviet AS-10 air-to-ground missile, but these munitions are not yet in the inventory. Moreover, the Indians are negotiating with the French for the AS-30 missile, but we believe its high cost remains a major stumblingblock in concluding a deal. We believe New Delhi also may be seeking the Soviet AS-11 antiradiation or a laser-guided missile for use on the MIG-29, based on US defense attache reporting of Indian interest in acquiring those types of missiles.

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Table 1
India's Air-Launched Missiles for the 1980s

Type	Origin	Guidance	All-Aspect [a]	Maximum Launch Range *(km)* [b]
Air-to-air missiles				
AA-2d	Soviet	Infrared	No	7
AA-7	Soviet	Radar	Yes	20
AA-8	Soviet	Infrared	No	3
AA-10	Soviet	Radar	Yes	30
Matra 550	French	Infrared	Yes	6
Super Matra 530-D	French	Radar	Yes	25

Type	Origin	Guidance	Maximum Launch Range *(km)*
Air-to-surface missiles			
AS-7	Soviet	Beam-rider or command guided	10
AS-10	Soviet	Laser	10
AS-11	Soviet	Antiradiation homing	200
AS-30	French	Command guided	12
Exocet	French	Radar	70
Sea Eagle	British	Radar	180

[a] Missile capable of being launched against another aircraft from any direction.
[b] Based on launch attitude of 5,000 meters.

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Figure 8. Indian-built Cheetah and Chetak helicopters.

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Appendix B

Fighter and Helicopter Production

The largest aircraft production program at Hindustan Aeronautics Limited (HAL) is the manufacture of MIG fighters under license from the USSR. Several variants of MIG-21s have been built since the 1960s. India began series production of the MIG-21BIS last year after assembling an estimated 90 aircraft. Some 250 are to be produced,

HAL also has begun tooling up a new line for the assembly and eventual production of 165 MIG-27 aircraft, a ground attack derivative of the MIG-23 aircraft imported by the Indian Air Force. The first Indian-assembled MIG-27 is scheduled to roll out of HAL in 1984, according to the press, but there have been delays in setting up the production line and the first aircraft probably will not appear before early 1985. New Delhi's purchase of MIG-29s includes the licensed production of the aircraft, which we expect will replace the MIG-21 line.

A relatively recent addition to HAL's assembly line is the Anglo-French Jaguar strike aircraft. The Indian press reports that 76 aircraft are to be assembled from kits, of which we estimated at least five have been built since early 1982. Indian-assembled Jaguars will differ from the 40 delivered by the United Kingdom in flyaway condition by incorporating improved avionics and progressively more Indian-manufactured components, including an Indian-designed IFF (identification friend or foe) system.

The Air Force intends to replace older Indian-built fighters with a new light combat aircraft equipped with the latest avionics for the late 1980s and 1990s. After several years of seeking assistance from Western Europe and the USSR for the design and manufacture of such an aircraft, the Indian Government recently decided to collaborate with the United Kingdom,

India resisted Soviet pressures against a joint development project with Britain. New Delhi, in our view, probably believed that the technology for the proposed new aircraft being offered by the United Kingdom is better suited to Indian requirements for air defense and close-air support.

India also appears finally to be moving ahead on a helicopter modernization program that was officially authorized in 1976 but hampered by bureaucratic, design, and technical delays. India's Defense Minister recently announced that West Germany will collaborate with New Delhi in the development and production of 200 advanced, twin-engine light helicopters. India wants to replace the two types of single-engine helicopters it now manufactures, both designed by the French (see figure 8), with one type that is more versatile and more likely to survive in combat. The proposed new helicopter is to be used for a variety of missions, including armed reconnaissance, antitank, and antisubmarine duties. Because it is still in the design stage and will require a long leadtime to start production, the helicopter most likely will not be operationally deployed before the early 1990s.

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Table 2
Performance Comparison of Principal Fighters
Likely To Be Found in South Asia During the 1980s

Aircraft	MIG-21BIS	MIG-23MF	MIG-23BN	MIG-27	MIG-29	Jaguar	Sea Harrier	Mirage 2000	F-16
Producer	USSR/India	USSR	USSR	USSR/India	USSR	UK/France/ India	UK	France	US
Role	Fighter-interceptor	Fighter-interceptor	Ground attack	Ground attack	Fighter-interceptor	Ground attack	Multi-mission	Multi-mission	Multi-mission
Maximum speed *(knots)*									
Sea level	700	730	730	730	730	690	600	750	800
12,200 meters	1,260	1,350	975	975	1,260	865	540	1,300	1,100
Combat ceiling *(meters)*	18,800	18,300	16,700	13,000	18,800	15,800	14,300	9,000	18,200
Combat radius (with external fuel, NM) [a]									
Air intercept	210	340			460		550	900	1,100
Attack (H-L-H) [b]	195	300	380	350		640	350	750	750
Armament									
Guns	1x23 mm	1x23 mm (twin)	1x23 mm (twin)	1x30 mm	1x23 mm	2x30 mm	2x30 mm	2x30 mm	1x20 mm
Missiles	4xAAMs (IR and SAR) [c] 2xASMs	4xAAMs (IR and SAR) [c] 2xASMs	4xAAMs (IR) 2xASMs	2xAAMs (IR) 4xASMs	6xAAMs (IR and SAR) [c] 4xASMs	4xAAMs (IR) 3xASMs	2xAAMs (IR) 2xASMs	5xAAMs (IR and SAR) [c] 3xASMs	6xAAMs (IR) 6xASMs
Rockets									
16 shot pods (57 mm)	4	4	4	4					
32 shot pods (57 mm)	2	4	4	4					
1 shot pod (240 mm)	4	4	4	4					
18 shot pods (68 mm)						4	4	4	
Bomb load *(kg)*	1,500	2,000	3,000	3,500		4,000	2,300	5,100	4,800
Air intercept radar	Jay Bird	High Lark A	None	None	Pulse Doppler	None	Blue Fox	RDI or RDM	AN/APG-66

[a] Mil-C mission rules applied, which define among other things the aircrafts' fuel reserves for takeoff and landing.
[b] Assumes a 900-kilogram bomb load.
[c] Infrared and semiactive radar.

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